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US-PAT-NO: 5793126

DOCUMENT-IDENTIFIER: US 5793126 A

TITLE: Power control chip with circuitry that isolates switching elements and bond wires for testing

---------- KWIC ---------

TITLE - TI:

Power control chip with circuitry that isolates switching elements and bond wires for testing

Details | Text | Image | HTML | KWIC

	Document ID	Kind Codes	Source	Issue Date	Pages	
2	US 20020030088		US-PGPUB	20020314	14	Dev
3	US 6334566 B1		USPAT	20020101	14	Dev
4	US 6299049 B1		USPAT	20011009	15	Dev
5	US 6230569 B1		USPAT	20010515	9	Use
6	US 5994910 A		USPAT	19991130	7	App
7	US 5894981 A		USPAT	19990420	14	Int
8	US 5793126 A		USPAT	19980811	7	Pow

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U.S. Patent Aug. 11, 1998 Sheet 2 of 3 5,793,126

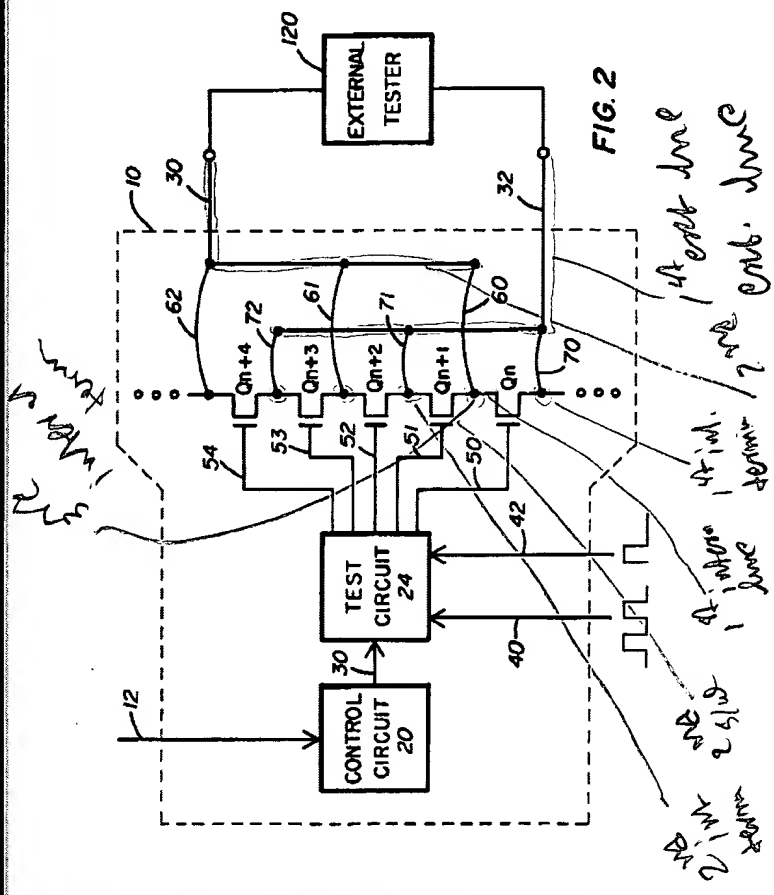

FIG. 2

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6 and 8. In other words, as shown in FIG. 21(a) the eleventh embodiment has a plurality of contact terminals 47 arrayed in the mold 80 of the silicon wafer, as described later with reference to FIG. 17(b), to correspond to the electrodes 3 of the device under test, tin plating 204 formed on the surface of the electrodes 200 integrated with each contact terminal, and gold plating 205 formed on the electrode 69 of the polyimide film 65 forming the lead out wire 48 are subjected to heat expansion, connected by forming a lead alloy and a multilayer film 44 comprising the contact terminals 47 formed by an integration of the polyimide film 65 and the electrode 200.

DEPR:
The contact terminal 47 of this embodiment is further capable of easily adapting to semiconductor devices with an electrode pitch narrower than 0.1 mm, to a range of 10 to 20 .mu.m. More specifically, one side of the bottom of the contact terminal 47 can easily be formed to a size of 5 .mu.m. In terms of the multilayer film, the height of the contact terminal 47 can be achieved at a precision within .+-.2 .mu.m during forming, and, as a result, even when utilizing the clamping member (clamp plate) 43 on the area 44a arrayed with a plurality of contact terminals 47 to enclose the cushioning layer 46 and cause a projection to eliminate slack in the multilayer film

Details | Text | Image | KWIC

	U	1	Document ID	Issue Dat	Pages	Tit
1	☐	☐	US 20010009376		21	Probe arrangement assembly, probe arrangement
2	☐	☑	US 6305230 B1	20011023	34	Connector and probing syst
3	☐	☐	US 5593335 A	19970114	95	Method of manufacturing an
4	☐	☐	US 5380681 A	19950110	12	Three-dimensional multichi fabricating

Details | Text | Image

(12) United States Patent
Kasukabe et al.

(10) Patent No.: US 6305230 B1
(45) Date of Patent: Oct. 23, 2001

(54) **CONNECTOR AND PROBING SYSTEM**

(75) Inventors: **Susumu Kasukabe**, Yokohama; **Terutaka Mori**, Urayasu; **Akihiko Ariga**, Musashimurayama; **Hidetaka Shigi**, Hakone-machi; **Takayoshi Watanabe**, Fujisawa; **Ryuji Kono**, Chiyoda-machi, all of (JP)

(73) Assignee: **Hitachi, Ltd.**, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/423,385**

(22) PCT Filed: **May 14, 1998**

(86) PCT No.: **PCT/JP98/01722**

§ 371 Date: **Nov. 8, 1999**

§ 102(e) Date: **Nov. 8, 1999**

(87) PCT Pub. No.: **WO98/52218**

PCT Pub. Date: **Nov. 19, 1998**

(30) **Foreign Application Priority Data**

May 9, 1997 (JP) 9-119107
Mar. 3, 1998 (JP) 10-049912

(51) **Int. Cl.**[7] **G01L 1/00**
(52) **U.S. Cl.** **73/855**
(58) **Field of Search** 73/855, 856; 174/250

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,902,003 * 8/1975 Wheeler et al. 174/250
4,926,034 * 5/1990 Banjo et al. 235/492

FOREIGN PATENT DOCUMENTS

2-163664 6/1990 (JP) .
5-243344 9/1993 (JP) .
7-283280 10/1995 (JP) .
8-083824 3/1996 (JP) .
8-220128 8/1996 (JP) .

OTHER PUBLICATIONS

Leslie et al., "Membrane Probe Card Technology", 1998 IEEE International Test Conference, Paper 30.1, pp. 601–607.

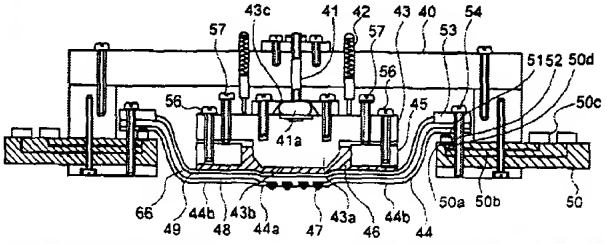
* cited by examiner

Primary Examiner—Max Noori
(74) *Attorney, Agent, or Firm*—Antonelli, Terry, Stout & Kraus, LLP

(57) **ABSTRACT**

A connection device and test system is capable of stable, low load damage-free probing of devices under test, which have many pins with a narrow pitch. Furthermore in order to achieve high speed exchange of electrical signals or so-called high frequency electrical signals, a support member is provided for supporting the connection device, a plurality of pointed contact terminals are arrayed in an area on the probing side, a multilayer film is provided having a plurality of lead out wires electrically connected to the contact terminals and a ground layer enclosing an insulation layer, and a frame is clamped on the rear side of the multilayer film. A clamping member is provided on the frame to make the multilayer film project out to eliminate slack in the multilayer film, a contact pressure means is provided for making the tips of the contact terminals contact each of the electrodes with predetermined contact pressure from the support member to the clamping member, and a compliance mechanism is provided so that the contact terminal group of the tip surface is arrayed in parallel with the electrode group terminal surface, so that the tips of the contact terminals contact the surface of the electrodes with an equal pressure.

14 Claims, 18 Drawing Sheets



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DOCUMENT-IDENTIFIER: US 6305230 B1
TITLE: Connector and probing system

DEPR:
FIG. 21(a) is a view showing a essential portion of the multilayer film arrayed with the contact terminals in the eleventh embodiment of the connection device of this invention. The structure of this tenth embodiment for connecting the lead out wires 48 in the multilayer film 44 with the connection terminals 47 is different from the previous embodiments, however it is otherwise configured identically to the connection devices for the embodiments shown in FIGS. 2, 5, 6 and 8. In other words, as shown in FIG. 21(a) the eleventh embodiment has a plurality of contact terminals 47 arrayed in the mold 80 of the silicon wafer, as described later with reference to FIG. 17(b), to correspond to the electrodes 3 of the device under test, tin plating 204 formed on the surface of the electrodes 200 integrated with each contact terminal, and gold plating 205 formed on the electrode 69 of the polyimide film 65 forming the lead out wire 48 are subjected to heat expansion, connected by forming a lead alloy and a multilayer film 44 comprising the contact terminals 47 formed by an integration of the polyimide film 65 and the electrode 200.

DEPR:
The contact terminal 47 of this embodiment is further capable of easily

Details Text Image KWIC

	U	1	Document ID	Issue Dat	Pages	Ti
1	☐	☐	US 20020005569		12	Contact terminal element, manufacture thereof.
2	☑	☐	US 20010009376		21	Probe arrangement assembl probe arrangement
3	☑	☐	US 6344752 B1	20020205	17	Contactor and production
4	☑	☐	US 6315605 B1	20011113	11	Printed circuit board sti
5	☑	☐	US 6315580	20011113	25	PCB connector module for

US006305230B1

(12) **United States Patent**
Kasukabe et al.

(10) **Patent No.: US 6,305,230 B1**
(45) **Date of Patent: Oct. 23, 2001**

(54) **CONNECTOR AND PROBING SYSTEM**

(75) Inventors: **Susumu Kasukabe**, Yokohama; **Tarutaka Mori**, Urayasu; **Akihiko Ariga**, Musashimurayama; **Hidetaka Shigi**, Hakone-machi; **Takeyoshi Watanabe**, Fujisawa; **Ryuji Kono**, Chiyoda-machi, all of (JP)

(73) Assignee: **Hitachi, Ltd.**, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/423,385**

(22) PCT Filed: **May 14, 1998**

(86) PCT No.: **PCT/JP98/01722**

§ 371 Date: **Nov. 8, 1999**

§ 102(e) Date: **Nov. 8, 1999**

(87) PCT Pub. No.: **WO98/52218**

PCT Pub. Date: **Nov. 19, 1998**

(30) **Foreign Application Priority Data**

May 9, 1997 (JP) 9-119107
Mar. 3, 1998 (JP) 10-049912

(51) **Int. Cl.**[7] **G01L 1/00**
(52) **U.S. Cl.** **73/855**
(58) **Field of Search** 73/855, 856; 174/250

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,902,003 * 8/1975 Wheeler et al. 174/250
4,925,034 * 5/1990 Barjo et al. 235/492

FOREIGN PATENT DOCUMENTS

2-163564 6/1990 (JP).
5-243344 9/1993 (JP).
7-283280 10/1995 (JP).
8-083824 3/1996 (JP).
8-220138 8/1996 (JP).

OTHER PUBLICATIONS

Leslie et al., "Membrane Probe Card Technology", 1998 IEEE International Test Conference, Paper 30.1, pp. 601–607.

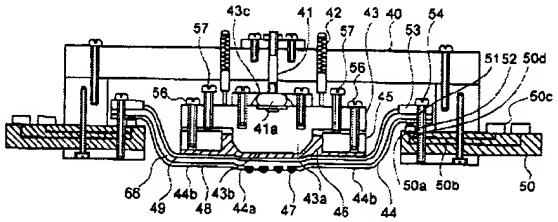
* cited by examiner

Primary Examiner—Max Noori
(74) *Attorney, Agent, or Firm*—Antonelli, Terry, Stout & Kraus, LLP

(57) **ABSTRACT**

A connection device and test system is capable of stable, low load damage-free probing of devices under test, which have many pins with a narrow pitch. Furthermore in order to achieve high speed exchange of electrical signals or so-called high frequency electrical signals, a support member is provided for supporting the connection device, a plurality of pointed contact terminals are arrayed in an area on the probing side, a multilayer film is provided having a plurality of lead out wires electrically connected to the contact terminals and a ground layer enclosing an insulation layer, and a frame is clamped on the rear side of the multilayer film. A clamping member is provided on the frame to make the multilayer film project out to eliminate slack in the multilayer film, a contact pressure means is provided for making the tips of the contact terminals contact each of the electrodes with predetermined contact pressure from the support member to the clamping member, and a compliance mechanism is provided so that the contact terminal group of the tip surface is arrayed in parallel with the electrode group terminal surface, so that the tips of the contact terminals contact the surface of the electrodes with an equal pressure.

14 Claims, 16 Drawing Sheets



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DOCUMENT-IDENTIFIER: US 5469733 A
TITLE: Cantilever for atomic force microscope and method of manufacturing the
cantilever

ABPL:
A cantilever for an atomic force microscope includes a probe and a cantilever
body supporting the probe, the probe deflecting in response to an atomic force
between said probe and a sample, at least the surface of the probe including
one of a resist film and a sputtered film. One method of manufacturing the
cantilever includes selectively etching the surface of a silicon substrate to
form an etch pit, forming a resist film in at least the etch pit, forming a
nitride film on the resist film, forming a glass base plate on the nitride film
in a predetermined area not including the etch pit, and removing the silicon
substrate. An atomic force microscope is also provided in which the cantilever
is used to measure an atomic force between a sample and the probe having a
desired film on a surface. A sample surface evaluating method is further
provided by which the adhesion between the desired film or substance and the
sample surface can be evaluated quantitatively from the measured atomic force
without damaging the sample surface.

Details Text Image KWIC

	Document ID	Kind Codes	Source	Issue Date	Pages	
1	US 5469733 A		USPAT	19951128	26	Canti

US005469733A

United States Patent [19]

Yasue et al.

[11] **Patent Number: 5,469,733**

[45] **Date of Patent: Nov. 28, 1995**

[54] **CANTILEVER FOR ATOMIC FORCE MICROSCOPE AND METHOD OF MANUFACTURING THE CANTILEVER**

[75] Inventors: **Takao Yasue**; Tadashi Nishioka, both of Itami, Japan

[73] Assignee: Mitsubishi Denki Kabushiki Kaisha, Tokyo, Japan

[21] Appl. No.: 194,169

[22] Filed: **Feb. 9, 1994**

[30] **Foreign Application Priority Data**

Feb. 16, 1993 [JP] Japan 5-026841

[51] Int. Cl.[6] G01B 5/28; H01J 37/26

[52] U.S. Cl. 73/105; 250/306; 250/307

[58] Field of Search ..... 73/105; 250/306, 250/307, 423 P

[56] **References Cited**

U.S. PATENT DOCUMENTS

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5,051,578	9/1991	Bayer et al.	437/225
5,066,858	11/1991	Quate et al.	250/306
5,166,520	11/1992	Prater et al.	250/307
5,261,571	12/1993	Yamamoto et al.	250/307
5,317,533	5/1994	Quate et al.	250/307
5,334,835	8/1994	Nakayama et al.	250/307

OTHER PUBLICATIONS

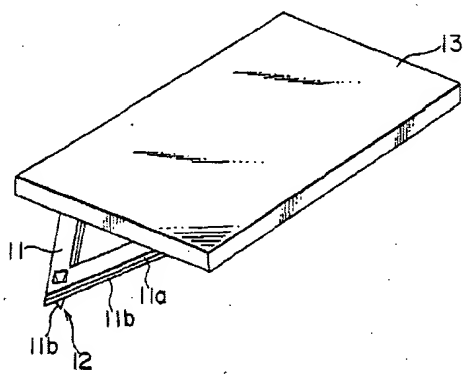
Chalmers et al., "Determination of Tilted Superlattice Structure by Atomic Force Microscopy", Applied Physics Letter 55, Dec., 1989. pp. 2491–2493.

Primary Examiner—Richard Chilcot
Assistant Examiner—George M. Dombroske
Attorney, Agent, or Firm—Leydig, Voit & Mayer

[57] **ABSTRACT**

A cantilever for an atomic force microscope includes a probe and a cantilever body supporting the probe, the probe deflecting in response to an atomic force between said probe and a sample, at least the surface of the probe including one of a resist film and a sputtered film. One method of manufacturing the cantilever includes selectively etching the surface of a silicon substrate to form an etch pit, forming a resist film in at least the etch pit, forming a nitride film on the resist film, forming a glass base plate on the nitride film in a predetermined area not including the etch pit, and removing the silicon substrate. An atomic force microscope is also provided in which the cantilever is used to measure an atomic force between a sample and the probe having a desired film on a surface. A sample surface evaluating method is further provided by which the adhesion between the desired film or substance and the sample surface can be evaluated quantitatively from the measured atomic force without damaging the sample surface.

9 Claims, 18 Drawing Sheets



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US-PAT-NO: 5193540

DOCUMENT-IDENTIFIER: US 5193540 A

TITLE: Structure and method of manufacture of an implantable microstimulator

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Detailed Description Text - DETX:

The power supply portion of 12 provides voltage at two levels, for example, approximately -7 to -15 volts, for providing stimulating pulse energy storage and -2 to -4 volts for power for digital logic 16. Data detector 12 also provides clock and digital data information to logic 16 which decodes the control information contained within the modulated, alternating magnet field. Such decoded information is used by the logic 16 to control switch 17 which controls the charge stored on the capacitor 20, between electrodes 14 and 15. Logic 16, which is preferably high speed, low current, silicon gate CMOS, also controls switch 18, (which may be a transistor), which controls the stimulating pulse current (which is a discharge of the stored charge between electrodes 14 and 15) which flows between electrodes 14 and 15. Logic 16 also controls current amplitude buffer 19. This controls the amount of current allowed to flow in each stimulating pulse

Details Text Image HTML KWIC

	Document ID	Kind Codes	Source	Issue Date	Pages	
115	US 5193540 A		USPAT	19930316	16	Str
116	US 5128737 A		USPAT	19920707	43	Sem
117	US 5119162 A		USPAT	19920602	24	Int
118	US 5099309 A		USPAT	19920324	12	Thr
119	US 5074629 A		USPAT	19911224	42	Int
120	US 4966646 A		USPAT	19901030	44	Met
121	US 4943032 A		USPAT	19900724	59	Int

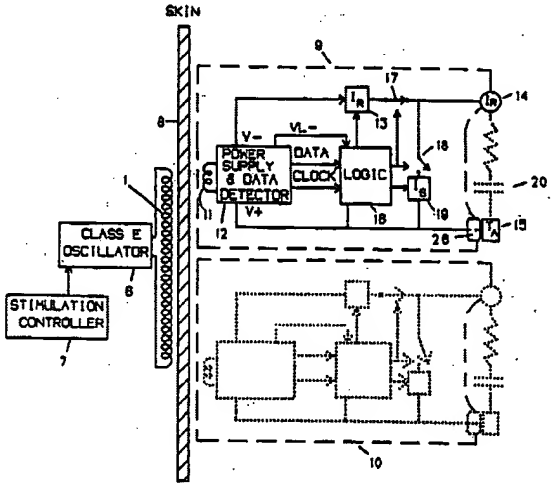

FIG. 2

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US-PAT-NO: 5358514

DOCUMENT-IDENTIFIER: US 5358514 A

TITLE: Implantable microdevice with self-attaching electrodes

---------- KWIC ---------

Detailed Description Text - DETX:

The power supply portion of 12 provides the operating and stimulating voltages for the microdevice, with the energy being derived from the signal received through the coil 11 as coupled from the coil 40. The operating voltage may be at two levels, for example, approximately -7 to -15 volts, for providing stimulating pulse energy storage; and -2 to -4 volts for providing operating power for digital logic 16. Data detector 12 also provides clock and digital data information to logic 16 which decodes the control information contained within the modulated, alternating magnet field. Such decoded information is used by the logic 16 to control switch 17 which controls the charge stored on the capacitor 20, connected between electrodes 14 and 15. Capacitor 20 is located inside the hermetically sealed tube that comprises the housing of the microdevice 9. In some embodiments, the capacitor 20 may actually be found outside of the housing using the electrodes 14 and 15, but

Details Text Image HTML KWIC

	Document ID	Kind Codes	Source	Issue Date	Pages	
104	US 5358514 A		USPAT	19941025	17	Imp
105	US 5355102 A		USPAT	19941011	16	HDI
106	US 5315130 A		USPAT	19940524	39	Very
107	US 5314458 A		USPAT	19940524	19	Sing
108	US 5280192 A		USPAT	19940118	14	Thr
109	US 5276455 A		USPAT	19940104	42	Pack
110	US 5274350 A		USPAT	19931228	6	Shu

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U.S. Patent Oct. 25, 1994 Sheet 2 of 5 5,358,514

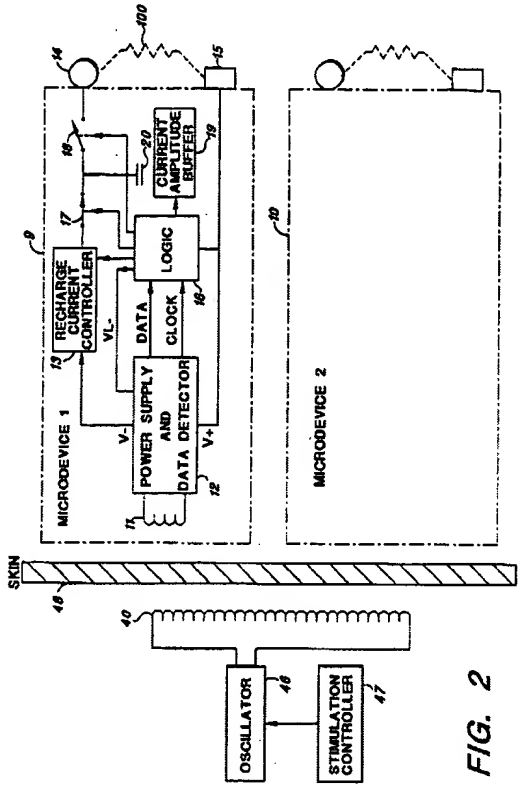

FIG. 2

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